PROGRAM WITH ABSTRACTS

April 14 and 15, 2023

Center for Sustainability and the Environment
Bucknell University
http://sustainabilitysymposium.scholar.bucknell.edu/

Table of Contents

The Sustainability Symposium celebrates sustainability and environmental related research, teaching, creative works, practice, and action where faculty, staff, students, and community stakeholders from regional institutions share their completed and ongoing works, network for ongoing or new initiatives, and are inspired by shared keynote activities. This annual meeting showcases work from the natural sciences, physical sciences, social sciences, engineering, management, and humanities exploring emerging themes such as climate change, energy, human rights, food, and resilience.

The Center for Sustainability & the Environment

The Bucknell Center for Sustainability & the Environment creates impactful, interdisciplinary, experiential opportunities for learning and research that address global and environmental challenges. By enabling collaborative scholarship from across the University, we empower students and faculty to explore, learn about, engage with and transform their world.

The Center for Sustainability & the Environment was created as the Bucknell Environmental Center in 2005 with support from about 50 faculty and staff from across the University and from students, who helped to define areas of interest. From the beginning, the center sought to create a University-wide platform capable of supporting collaborative, interdisciplinary scholarship, teaching and outreach, situating Bucknell as a national leader in applied research and teaching on 21st-century environmental and sustainability issues.

Today, the Center's three signature programs manage a network of 18 interdisciplinary field stations and sites in Pennsylvania giving students, faculty, and community partners experiential, applied research and learning opportunities that impact our local communities and beyond.

Watershed Sciences & Engineering Program
Bucknell makes the most of our proximity to the majestic Susquehanna River through the Watershed Sciences & Engineering Program. By taking the classroom outdoors, Bucknell connects people to the river and builds upon our existing strengths in science and engineering. Faculty, staff and students partner with local, state and federal organizations on watershed research, stewardship and conservation projects.

Sustainable Technology Program
Bucknell's Sustainable Technology Program works to build on the University's advances in sustainable technology through research, programs and projects. Using the campus as a living-learning laboratory, the program brings a collaborative, hands-on approach to a variety of topics, including climate change, renewable energy and eco-landscaping.

Place Studies Program
Working in collaboration with faculty, students and staff from across the humanities, social sciences and management, the Place Studies Program develops teaching, research and outreach projects.These opportunities allow faculty and students to actively engage with the social, political, historical and cultural dimensions of nature-society relationships and sustainability, related to how we imagine, understand and engage with "place."

Letter from Symposium Co-Chairs

Welcome to the 10th Annual Sustainability Symposium!

In 2013, the Center for Sustainability and Environment held its first sustainability symposium, *Envisioning a Sustainable University*. That event furthered discussions and actions that continued to push Bucknell's progress towards being a more sustainable institution. In the years since, the sustainability symposia have centered on topics including Reimagining Prosperity (2014); Imagination, Design, and Creativity (2015); Global Sustainabilities (2016); Generations of Power (2017); Climate Changes: All Hands on Deck (2018); Envisioning the Future: Energy, Climate, and Human Rights (2019); Adapting in Uncertain Times (2021); and Is it Really too late?: Hope, Agency, and Change (2022). Each symposium has engaged hundreds of attendees in discussions furthering our understanding of human-environment interactions; showcasing projects, creative works, and research from across disciplines; and engaging practitioners and researchers in collaborative endeavors for thriving communities.

This year's symposium, *Moving from hope to action: Building thriving communities*, builds on this foundation and specifically provides faculty, staff, students, practitioners, and community stakeholders a forum to share research, teaching, creative works, and collaborations that generate dialogue on action towards creating prosperous communities. Last year, we discussed the power of radical hope as the foundation of future research, teaching, and community engagement. This year, we move forward to discussion on actions that help conserve natural and human communities, stories of challenges and achievements, and reflection on best management and collaboration practices that guide communities towards thriving futures in an ever changing world.

What does it mean to thrive? How can human communities and natural communities, in all their complexities, mutually thrive? In *Thriving Beyond Sustainability: Pathways to a Resilient Society* (2010), Andres R. Edwards argues that, "The essence of thriveability is a belief in the capacity of the human spirit to collaborate in creating new possibilities for lasting solutions." This year's keynote speaker, Curt Gervich, provides a perspective on this collaboration from a community-engaged environmental planning angle. Posters and talks over the two days of the symposium touch on this question from diverse perspectives.

This year, we welcome over 50 speakers/presenters representing more than 110 authors, activists, practitioners, and artists from 13 regional universities, organizations, and government agencies. We welcome you to learn from one another, inspire one another, and create new networks that nurture pathways for thriving in our communities and work.

Drs. Shaunna Barnhart and Milton Newberry, III,
Co-Chairs, 10th Annual Sustainability Symposium

Schedule of Events

DAY 1: FRIDAY - APRIL 14

5:00 p.m. – 6:30 p.m. *2nd Floor by Terrace Room* - Registration and poster set-up.

6:30 p.m. – 7:30 p.m. *Forum* - Welcome and Keynote address, ***The Mighty Nature of Small Places*** by Dr. Curt Gervich.

7:30 p.m. – 9:00 p.m. *Terrace Room* - Poster Session, Art Displays, and Creative Works with tabling by student environmental and sustainability organizations with Dessert Bar in *241 ABCD*

9:00 p.m – 9:15 p.m. *Terrace Room* - Poster Awards Ceremony

DAY 2: SATURDAY - APRIL 15

8:00 a.m. – 9:00 a.m. Registration and light breakfast refreshments

9:00 a.m. – 11:00 a.m. *Walls Lounge* - U.N. Climate Action Simulation

11:00 a.m. – 12:00 p.m. Parallel Professional Development Panels
Center Room - Alumni Career Panel
Forum - Integrating SDGs into Courses and Community- Based Learning

12:00 p.m. – 1:00 p.m. *Walls Lounge* – Lunch & “SDGs around the World” Student Panel

1:00 p.m. – 2:00 p.m. Parallel Oral Presentations
Gallery Theater - Session A: Towards Social Action: Sustainable Cities and Communities
Forum - Session B: Towards Equitable Action and Justice

2:00 p.m. – 3:00 p.m. Parallel Oral Presentations
Forum - Session C: Towards Environmental Action

3:00 p.m. – 3:15 p.m. *Forum* - Closing Remarks

Keynote Address

The Mighty Nature of Small Places

Dr. Curt Gervich

PROFESSOR OF ENVIRONMENTAL SCIENCE
SUNY Plattsburgh

Dr. Curt Gervich is an environmental planner by training, who focuses his scholarly work and outreach on communities and community engagement. His work combines aspects of sustainability, environmental justice, and community resiliency to address issues at the nexus of food, water, energy, and biodiversity. Dr. Gervich has worked across the U.S., including the Midwest, Southeast, New England, and Alaska, conducting work in forest ecology and community development with private landowners and the forest industry. Currently, Dr. Gervich works with community shareholders to create innovative methods for grassroots interested parties to engage in community planning processes on the use and protection of natural resources. In addition, he has conducted research on the impact of the COVID-19 pandemic on participatory planning and the impact of the integration of climate change data in games on learners.

Professional Development Panel Sessions

Student Professional Development: Alumni Career Panel

(Saturday, April 15, 11:00am-12:00pm - ELC Center Room)

The alumni panel will generate a discussion that examines the career path of this diverse group of Bucknell alumni. Coming from a myriad of disciplines, the panelists will bring together their recommendations and perspectives as they deliberate over their work and the possible career opportunities in policy, environmental disciplines, and sustainability. This panel will be moderated by Maggie McConnell ‘22, Americorps VISTA in the BCSE.

Alumni Panelists:

ANDY BURR ‘04

Co-Founder and Chief Growth Officer of OneEthos

Andy Burr is a climate leader, innovator, and entrepreneur. He is Co-Founder and Chief Growth Officer of OneEthos, a solar lending fintech startup. He previously cofounded Ecountabl, an award-winning ESG data startup that was acquired by a bank in 2022. Andy served in multiple roles at the U.S. Department of Energy from 2014-2019, leading policy for the Building Technologies Office and launching a major urban climate initiative announced by the Obama Administration in 2016. Prior to public service, he co-directed a $20 million special climate policy project in partnership with U.S. mayors and leading environmental philanthropies. He has advised major U.S. presidential campaigns on climate initiatives and been quoted in national media including The New York *Times* and *USA Today*. Andy graduated from Bucknell University and is a lifelong Buffalo Bills, Buffalo Sabres, and Baltimore Orioles fan.

BETHANY HAINES MARTIN '08

Managing Director, Strategy and Impact at Conservation International

Bethany oversees strategic planning and reporting at Conservation International (CI), an environmental nonprofit organization focused on climate change, ocean conservation, and sustainability. She provides guidance and direction to programs in 30+ countries. Her development of global organizational capabilities plays a key role in CI's rapid growth and continued strategic focus. Since joining CI in 2010, Bethany has held several positions at the nexus of strategy, operations, and program delivery. Throughout her career, she has successfully oriented diverse global teams toward a common purpose and has mentored numerous emerging leaders in the field of conservation. Bethany began her career at the National Geographic Society, where she worked on a national education campaign. She holds a bachelor's degree in geography from Bucknell University and resides in the Washington D.C. area.

ALLISON CAMPBELL '12

Environmental Specialist, New Jersey Dept of Environmental Protection (NJDEP), Northern Bureau of Water Compliance and Enforcement

Allison Campbell graduated from Bucknell in 2012 with a B.A. in Animal Behavior and English—Creative Writing. During her time at Bucknell, she conducted research in the primate lab and interned at a zoo and aquarium. Her semester abroad in Queensland, Australia deepened her interest in conservation and environmental fieldwork. After graduating from Bucknell, she earned a Master in Environmental Management from Duke University in 2014, focusing on coastal and marine ecosystems. Allison then joined the nonprofit Alliance for the Chesapeake Bay in the Alliance's Pennsylvania office, where she worked with state, local, and other nonprofit partners on stormwater mitigation and tree planting projects. For the past six years, she has worked as an Environmental Specialist for the New Jersey Department of Environmental Protection (NJDEP) in the Northern Bureau of Water Compliance and Enforcement. At NJDEP, Allison performs inspections and investigations at a wide variety of facilities to determine compliance with permits, rules and regulations related to drinking water, wastewater, stormwater, and water allocation.

Faculty Professional Development: Integrating SDGs into Courses and Community- Based Learning

(Saturday, April 15, 11:00am-12:00pm - ELC Forum)

In this session, hear about and discuss ways to incorporate sustainability and community-based learning into courses and research with students. Session moderated by Shaunna Barnhart, BCSE Place Studies Program director.

Community-Based Research for Advancing Sustainability in Our Communities

Neil Leary, Director, Center for Sustainability Education, Dickinson College.

Introduction to Sustainable and Resilient Communities, a course that I teach at Dickinson College, introduces students to asset-based community development practices using a sustainability lens, the U.N. Sustainable Development Goals, and application of systems thinking for social change in communities. The course features a semester-long “community action project.” Working in teams of 2 to 4, and in partnership with a community organization, the students research an issue of interest to the community organization, evaluate possible courses of action, and develop recommendations with the goals of benefitting the organization and helping to create a sustainable community. Topics this semester for the community action projects include reentry programs for formerly incarcerated people, interventions to address lingering impacts on learning from disruptions to schooling caused by COVID-19, and revising Borough ordinances to advance sustainability goals, among others. In this oral presentation, I will share strategies I use to scaffold the community action projects to support student success, benefits to the students and community from the projects, and challenges encountered.

University-Local Government Collaborations for Enhanced Climate Policy Efforts

Brandi Robinson, Assistant Teaching Professor, Dept. of Energy and Mineral Engineering, Pennsylvania State University.

The Local Climate Action Program brings together students and local government officials to advance local-scale climate policy initiatives. Students complete greenhouse gas emissions inventories for their assigned communities and then move forward with climate action planning activities to reduce emissions and build resiliency to anticipated impacts. The program works well because it provides students with the opportunity to engage in meaningful, high impact real world work while facilitating the advancement of the efforts in communities where the human resources may not be there to otherwise carry them forward. This presentation will be an opportunity to learn more about this program, think of ways we can scale and replicate it in other related work areas, and provide a platform for strategizing about further opportunities for university-government collaborations to serve our common interests in our communities.

Lunch Panel Session

Student Panel - “SDGs around the World

(Saturday, April 15, 12:00-1:00pm - ELC Walls Lounge)

Ally Balsam, Undergraduate Student, Bucknell University, **Joanna Raup Collado**, Undergraduate Student, Bucknell University, **Kendall Robertson**, Undergraduate Student, Bucknell University, & **Michaiah Augustine**, Undergraduate Student, Bucknell University, **Riley DeBaecke**, Undergraduate Student, Bucknell University.

This panel will focus on a dialogue among Bucknell students who have completed a study abroad experience for their peers who are considering participating in a study abroad program. Panelists will discuss their observations of country-specific actions in relation to the United Nations’ Sustainable Development Goals (SDGs). The panelists will be asked to reflect on their experience abroad and highlight how it provided them with different perspectives and insights. In addition, the panel will exhibit how all nations should recognize the interconnectedness of the hardships they face and how the SGDs call for global partnerships.

Oral Session 1.A: Towards Social Action for Sustainable Cities and Communities

(1:00-2:00pm - Location: Gallery Theater)

Il ne faut pas gâcher, il ne faut pas gaspiller: Exploring Waste as the Solution to Hunger in France since Victor Hugo's Les Misérables (1862)

Faythe Schulte, Undergraduate Student, Allegheny College.

My project, titled "Il ne faut pas gâcher, il ne faut pas gaspiller : Exploring waste as the Solution to Hunger in France since Victor Hugo's Les Misérables (1862)" answers the question "How are representations of hunger and waste in Victor Hugo's Les Misérables (1862) related to contemporary, French food and waste policies?" Hunger, food insecurity, and waste are three prominent, intertwined issues that impact populations around the world. Although these are global issues, the French have recognized the prevalence of these problems within their own country and taken action against them. France has one of the strongest approaches when coping with these issues because they have well-supported policies and initiatives around food insecurity and waste. Since 2016, France has implemented four national laws, initiated one international strategy, and supported international efforts against hunger, food insecurity, and waste. Knowing these remain prominent issues today, through a series of 35 interviews in the Spring of 2022 in Paris, France, I found that, even 161 years after its publication, Les Misérables exerted considerable influence on the images of everyday French people had of hunger. In Les Misérables, Hugo offers one solution to hunger: properly using [human] waste. In contemporary policies and initiatives, fighting food insecurity relies on waste reduction. Relying on political theory connecting policy to culture, I explore the relationship between images of hunger and waste in Hugo's Les Misérables and contemporary French policies and initiatives.

Mount Carmel Area Community Center

Sivanne Bachrach, Undergraduate Student, Bucknell University, **Katherine Leschner,** Undergraduate Student, Bucknell University, **Parker Cole,** Undergraduate Student, Bucknell University, **Sophia Ferraro,** Undergraduate Student, Bucknell University, **Julia Sullivan,** Undergraduate Student, Bucknell University, **& Jack Ziemba**, Undergraduate Student, Bucknell University.

Mount Carmel Area Community Center (MCACC) is a non-profit organization dedicated to improving the quality of life for its community members by providing educational, recreational, and cultural opportunities for all generations. MCACC has made significant progress in recent years with the help of a $250,000 state grant from the Commonwealth of Pennsylvania, which has enabled them to undertake vital renovations, such as roof reconstruction, asbestos abatement, and the installation of basic electrical services.Moreover, the community center has received a $500,000 grant from the Degenstein Foundation, which will support further renovations on the property. The MCACC is currently focused on renovating their auditorium space to rent out for private parties, which will generate income for the organization and fund additional property renovations. These efforts are aligned with sustainability goals, as the renovation of the community center will enable MCACC to provide a wider range of services and programs to the community, promoting social, economic, and environmental sustainability. The new and improved community center will provide a safe and healthy space for people of all ages to engage in educational, recreational, and cultural activities, which can contribute to social sustainability by fostering a sense of community and improving individual and collective well-being. The MCACC's commitment to sustainability is evident in its efforts to generate income through the rental of their renovated spaces, which will fund additional renovations and upgrades, promoting economic sustainability. Furthermore, the upgrades and renovations that have been made to the property, such as the installation of basic electrical services and the asbestos abatement, will contribute to environmental sustainability by improving the energy efficiency and safety of the building. In conclusion, the Mount Carmel Area Community Center's recent progress towards renovating their property aligns with sustainability goals by promoting social, economic, and environmental sustainability. The organization's commitment to providing a safe and healthy space for community members of all ages to engage in educational, recreational, and cultural activities is vital for building a sustainable and resilient community.

MORS 400 Consulting Project with The Improved Milton Experience (TIME)

Maggie Hopkins, Undergraduate Student, Bucknell University, **Josh Buckman,** Undergraduate Student, Bucknell University, **Matthew Feit,** Undergraduate Student, Bucknell University, **Bella Moynihan,** Undergraduate Student, Bucknell University, **Lindsey Skardon,** Undergraduate Student, Bucknell University, **& Cristian Vasquez**, Undergraduate Student, Bucknell University.

For our senior management consulting class at Bucknell University, we are working with George Venios and “The Improved Milton Experience,” also known as T.I.M.E., to assist in the revitalization plan for the town of Milton, PA. T.I.M.E. owns and works with several buildings, each with plans for different initiatives to bring in social and economic opportunities for the community. The two buildings in need of

renovations are the Miltonian Building and the Degenstein Building. The Miltonian will be renovated through grants awarded by the Degenstein foundation to create an Environmental Studies Field Station in partnership with the Bucknell Center for Sustainability & the Environment, and a flex space and museum to highlight the rich history of Milton. The Degenstein Building comprises two independent projects, one side will be renovated for the DIG Furniture Bank and the other side will hold entrepreneur office spaces and relocate the MakerShop and MakerSpace. Finally, the Moose building has been recently transformed into a community center and requires assistance gaining attention as a hub for community life. This building holds the new Jungle Teen Center, which will benefit from increased publicity as it is the most recently renovated floor in the building. Our overarching goal is to create a strategic plan for T.I.M.E. This will provide a unified, cohesive “campus” across these buildings, as well as providing an outline for the future of T.I.M.E. This work includes several components. We are creating a Pro Forma Analysis for the buildings to provide T.I.M.E. the ability to plan renovations and determine future revenue streams. For each of the buildings, we are surveying teens and adults to understand how T.I.M.E. can better serve them. Additionally, we are working to enhance their marketing and fundraising strategies. Through these methods, we are hoping to provide Milton with community based solutions to support long lasting economic growth.

Oral Session 1.B: Towards Equitable Action and Justice

(1:00-2:00pm - Location: ELC Forum)

Tunes and Typhoons

Vivian Kuang, Undergraduate Student, Bucknell University, **Milton Newberry III,** Center for Sustainability & the Environment, Bucknell University.

Where does water come from? Is water an unlimited resource? A large proportion of the human population, too often, takes water for granted. In addition, our use of water in our fundamental, economical, and agricultural practices, has led to the encounter of waterborne illnesses and chemicals that are toxic to plant and animal life. The UN Sustainable Development Goal No. 6, Clean Water & Sanitation, guides nations to ensure that clean water is available and accessible to people of all backgrounds. However, the practice of such availability and accessibility is riddled with issues, leading to increased water stress and a lack of potable water. I will use the art of live music and visual representation to highlight the dynamics between humans and their water usage as a technique to raise awareness for ethical ways to combat climate change.

Media Representation of Minority Groups: Are We Doing Well Enough?

Khue (Alex) Le, Undergraduate Student, Bucknell University, **Milton Newberry III,** Center for Sustainability & the Environment, Bucknell University.

With the first product dated back in the late nineteenth century, the film industry has evolved tremendously since then- from the silent black-and-white stop-motion movies to the advanced CGI depicting different planets and life forms. Movies, as well as many other media platforms, play a vital role in our daily lives nowadays as not only do they bring us updated information of various events, but they also showcase many artworks, opinions, ideologies, etc. Therefore, media is one of the main influential factors that shape how individuals perceive and form thoughts about the world subconsciously. Despite the improvements of the movie-making process, only in recent years does the media start to expand their content to reach and appeal to more audiences. In other words, more movies have included stories of characters coming from different marginalized groups in the United States in recent years. The two main questions still remain: are these efforts good enough to really represent these minority groups that have been silenced and extremely underrepresented all this time? What's the future direction from here for movie makers? In this comprehensive study, I'll explore a self-developed spectrum of representations of different racial ethnicities groups ranging from bad to good by giving example movies dating back from the very beginning of the cinema history to contemporary days. Furthermore, I'll address phenomena that are not commonly considered in media representation such as the cancel (or "woke") culture, the white savior complex, "edgy" humors, colorism, etc. "Ultimately, this research sheds light on how inequalities are still highly prolific and presented in the most commonly consumed form of entertainment; thus, reducing inequalities with awareness was the very first step for our sustainable development goal as global citizens.

Beyond Fossil Law

Ted Hamilton, Visiting Assistant Professor, Dept. of English & Dept. of Environmental Studies and Sciences, Bucknell University.

My presentation will examine how climate activists are using the legal system to fight back against the control of the fossil fuel industry. Drawing on my experience as a climate activist attorney, I will discuss how movements in the United States, Latin America, and elsewhere have engaged in civil disobedience and defended themselves in court against the industry's legal prowess. I will also highlight novel legal theories like the rights of nature and the public trust doctrine, which offer the possibility of using the law for (rather than against) climate justice.

Oral Session 2.A: Towards Environmental Action

(2:00-3:00pm - *Location: ELC Forum)*

Lewisburg Climate Action

Taylor Lightman, Director/Program Manager, Lewisburg Neighborhoods.

From 2021 to 2023, Lewisburg Neighborhoods embarked on an effort to create a local climate action plan alongside the Bucknell Center for Sustainability and the Environment and the Pennsylvania Department of Environmental Protection. Through this effort, the team conducted an inventory of emissions,

administered a survey about climate action and perceived climate vulnerability, and assembled a task force of local stakeholders to compile objectives and action items that made sense for Lewisburg.

Through the emissions inventory, the team found that emissions from transportation constituted the majority of emissions produced by the borough. When asked to think about the future, residents thought that it was important for Lewisburg to become a “walkable” and “bike-able” community. Similarly, in open response questions, comments about walking and biking issues were the plurality of all concerns raised. In total, the Climate Action Plan includes 5 transportation related objectives with 16 associated action items. Taylor Lightman, a member of Lewisburg’s LCAP technical team, will present the community transportation suggestions and mention areas of progress over the past year.

Shamokin Reuse Warehouse

Mia Hursh, Undergraduate Student, Bucknell University, **Riley DeBaecke,** Undergraduate Student, Bucknell University, **Mary Alexander,** Undergraduate Student, Bucknell University, **Georgia Lambrakis,** Undergraduate Student, Bucknell University, & **Daniel Loughney**, Undergraduate Student, Bucknell University.

Our senior Management Consulting group at Bucknell University is working with private, public, and nonprofit organizations in the Shamokin area through the Shamokin Environmental Resiliency Task Force (SERTF), newly renamed the Sustainability Coalition, which is developing a plan for a “reuse” warehouse to promote sustainable economic and environmental development in the town. The warehouse will function as a construction and demolition site to remediate and upcycle secondhand building materials from blighted properties in Northumberland county for commercial uses, residential, and the arts. Stressing a circular economy, the warehouse will partner with county and city housing authorities to procure materials from blighted properties. These materials will be taken to the reuse warehouse, cleaned, repaired, and sold. These materials may also be available as donations; for instance, they are used in art projects for schools with which the reuse warehouse has partnerships. In addition, the Economic Development Authority (EDA), which owns the warehouse, will use the proceeds from the warehouse’s inventory operations to fund the mayor’s newly-established blight task force.

Our contribution comes in the form of a strategic plan for the reuse warehouse that will outline projected worker compensation and staffing procedures. It will define a process for appropriately handling donations, procedures for procuring and maintaining vehicles for donation pickup, and researching renewable energy systems to power warehouse operations. The plan will also outline a board structure, including a building renovation team, a reuse and demolition team, and representatives from organizations in the Shamokin area. The measures for devising the plan include formulating the diagnostic phase, interviewing stakeholders and providing feedback, and applying our findings to write a step-by-step strategic plan to get the warehouse off the ground. Finally, from our research and interviews, we will devise best practices in congruency with warehouse operations prioritizing material associated with art, commercial, and residential reuse to outline the Shamokin reuse warehouse’s operations.

Indigenous peoples have influenced the distribution and genetic diversity of a wild staple food of Australia’s Western Desert

Chris Martine, David Burpee Professor of Plant Genetics and Research, Dept. of Biology, Bucknell University, **Tanisha Williams**, Richard E. and Yvonne Smith Post-Doctoral, Dept. of Biology, Bucknell University, **Chloe McGuire**, Doctoral Student, Dept. of Anthropology, Pennsylvania State University, **Amy Wrobleski**, Doctoral Student, Depts. Of Anthropology & Ecology, Pennsylvania State University, **Rebecca Bliege Bird**, Professor, Dept. of Anthropology, Pennsylvania State University.

The bush tomatoes (Solanum) of Australia are a diverse group of disturbance-adapted plant species, some of which play a pivotal role as subsistence resources and species of cultural significance to Aboriginal communities throughout the continent. The Martu, Indigenous foragers of the Western Desert, use a few Solanum species as food staples. Solanum diversiflorum, locally known as wamula, has an edible, tasty fruit eaten when moving throughout the landscape. Seeds of the species are bitter and discarded along movement corridors. These corridors are known as Dreaming pathways, and are the traditional Martu practices of patch burning, hunting, and collecting and scattering (passive planting) of species, and these practices still occur today. The Dreaming pathways create a mosaic of connected 'garden' centers that serve as campsites, and plant and animal processing sites throughout the Western Desert. It has been shown that these practices have positive ecological impacts on animal populations, but there has been little study on the Dreaming tradition impacts on plant species within the region. We are using population genomics methods to assess and compare genetic diversity and population structure of wamula populations within and outside of Martu title lands as a means to measure how the Martu have shaped the distribution, diversity, and dispersal patterns of S. diversiflorum. Our study provides evidence that humans, being some of the best long-distance dispersal agents, impact gene flow and plant distributions across Australia's Western Desert.

Revitalizing the strategic plan of Merrill W. Linn Conservancy

Kimseang Am, Undergraduate Student, Bucknell University, **Ella Payer,** Undergraduate Student, Bucknell University, **Kate Reinhardt,** Undergraduate Student, Bucknell University, **Logan Bushweller,** Undergraduate Student, Bucknell University, **Sante Nicolia,** Undergraduate Student, Bucknell University, & **Zach Bobeczko** Undergraduate Student, Bucknell University.

The mission of the Merrill Linn Conservancy is to preserve and protect significant ecological sites in Union, upper Northumberland, and neighboring counties and to engage the public on conservation issues critical to the health of our environment. Their work includes protecting land using conservation easements, providing non-destructive public access to appropriate protected lands for education and recreation, etc. They haven't had their strategic plan updated for a couple years now and struggle with the sustainability of the organization in terms of moving forward with greater visibility and capacity. Therefore, a group of senior management students from Bucknell University have this opportunity to work with Merrill Linn Conservancy to revitalize the strategic plan by doing research, analyzing the organization structure and eventually provide some recommendations.

Design and Fabrication of a Home Economic System to Gauge Photovoltaic Panel Health

Abdelghany Abouelnagga, Undergraduate Student, Bucknell University; **Colton Jiorle,** Undergraduate Student, Bucknell University; **Amal Kabalan,** T. Jefferson Miers Chair in Electrical Engineering and Associate Professor of Electrical & Computer Engineering, Bucknell University.

Photovoltaics are of increasing potential to help us overcome many power generation concerns. As a result, there are many advancements in how to improve its efficiency, but rarely any methods of how to track how that efficiency plummets due to outside factors, or life span. The goal of this project is to ensure proper documentation and some analysis of the data that we collect to ensure that the PV array is working at optimal efficiency. We collect data from multiple sensors, which are the essential elements contributing to tracking the solar cells' efficiency.

The main goal of this part was to explore how the IoT system using an ESP32 could interface with an LCD with the data being pushed to the cloud through necessary sensors. The code is mainly divided into modules that are imported into each other. There are two main pieces of code that run on two different microcontrollers. The first one is to send the data collected from the sensors to the cloud, and this feather is the one attached to the solar cell, so that it tracks the weather conditions, and calculates the power produced by the PV array. The other piece of code is responsible for pulling the data from the cloud, and this piece of connected along with the LCD, and it could be anywhere as long as there is an internet connection, as it accesses the data from the cloud, so it doesn’t need to be near the first microcontroller.

We then went on to access multiple data points that are collected over a certain period of time and average them, so that we can get a better sense of not only the immediate behavior of the solar cell but also an extension into a few days in the past of how the solar cell reacted to the weather conditions.

Genetic Diversity and Gene Flow in Paxistima canbyi A. Gray: A Rare Plant Species Across the Central Appalachian Region of the United States

Isaac Buabeng, Master's student, Bucknell University; **Melody Sain**, David Burpee Postdoctoral Fellow, Bucknell University; **Tanisha Williams,** Richard E. and Yvonne Smith Postdoctoral Fellow, Bucknell University; **Scott Schuette,** Botany Program Manager, Pennsylvania Natural Heritage Program at Western Pennsylvania Conservancy; **Christopher Martine,** David Burpee Professor of Plant Genetics and Research, Bucknell University.

Understanding the migratory patterns of genes in clustered metapopulations is important for conserving species considered to be on the edge of their range. My project will assess the genetic diversity and phylogeography of two major disjunct Paxistima canbyi (Canby's mountain lover or Cliff green, Celastraceae) populations - occupying the limestone-rich interior low plateaus of central Kentucky, Northern Tennessee, and southern Ohio, and the similarly limestone-rich central Appalachian mountains of southern Pennsylvania, West Virginia, Maryland, and Virginia - using a reduced-representation sequencing method i.e. Genotype-By-Sequencing (GBS). Data acquired through the Genotype-By-Sequencing (GBS) approach will be used to generate genomic libraries for assessing gene flow, genetic diversity, and migration patterns between other subpopulations and the phylogenetic relationships and historical introgression of populations within and between the two major disjunct Paxistima canbyi metapopulations. The results of my project will directly influence the conservation of Paxistima canbyi in the United States and will contribute to the growing body of knowledge on the genetic structure and phylogeography of edge-of-range populations.

Sustainable Multicultural Center Presentation

Elie Bukowski, Undergraduate Student, Bucknell University; **Jonathan Cabrera**, Undergraduate Student, Bucknell University; **Rai Carter**, Undergraduate Student, Bucknell University; **Omuhle Ndhlovu**, Undergraduate Student, Bucknell University, **Rich Kozick**, Presidential Professor of Electrical Engineering, Bucknell University.

As part of Bucknell's goal to increase sustainability on campus, the school has various renewable sources of energy such as the Living Greenhouse, Energy Hill, and senior gift system near the Sustainability Experiential Learning Laboratory building. The SELL property once promoted the school's sustainability ethos, but has not lived up to its original purpose. Our project will improve the campus by increasing the social, economic and environmental sustainability of the property which will be shown throughout our presentation.

The Bucknell community is negatively impacted by the lack of sustainability efforts in the SELL building on campus, as the building is underutilized and uses majority non-renewable energy. In order to work to

improve on these issues, we had to ensure that this center projects sustainability in all aspects. So we chose a 3-pronged approach: the center will promote social sustainability through clubs and organizations utilizing the space, and cross-cultural gardening and additional solar panels will increase the environmental and economic sustainability of the SELL building.
As part of this project, we modeled the SELL building to include many of the adjustments that we suggest should be implemented. The building will have a beautiful interior design, each room dedicated to creating a home-like atmosphere. As a PWI, this will help Bucknell expand its diversity and inclusiveness of students that come from diverse backgrounds.

In addition, we studied the potential for solar panels on this property, modeling the possible economic and environmental benefits for implementing an increased number of them and trimming foliage around the property. Cross-cultural gardening (also modeled) will improve the environmental and social sustainability of this institution as students will learn about their roots while benefiting the planet.

By implementing these few changes to the SELL building, Bucknell will increase its sustainability in an impactful and long-lasting way.

ESG & SDG Poster

Matthew D'Antoni, Undergraduate Student, Bucknell University; **Anita Casper,** Bucknell University.

My hope in creating this poster would be to explain how ESG is three pronged: environmental, economic, and social. Each of these components are critical to the future of sustainability, and I want to shine light on how students could get involved either directly (through personal action) or indirectly (simply by having a knowledge base on the matter). As issues of global warming continue to remain prevalent for nations around the world, it is our responsibility to work towards developing a cleaner world, which accounts for an encompassing cultural perspective (one that understands how culture influences the behavior of nations with regards to sustainability). My perceived problem is that students hear about the SDGs but have a hard time seeing their feasibility—some are very broad (ie: ending world hunger). For this reason, speaking to the intersectionality of how global economies and cultures can work closely in unison with the environment in a productive way will hopefully alleviate any skepticism students have towards sustainable development goals. The three that I have chosen to target are #7 (affordable and clean energy), #9 (industry, innovation, and infrastructure), and #12 (Responsible consumption and production). Each of these tackles key issues related to the environment, but they also account for the need to have a strong economy. A strong economy means to support the social sphere for citizens around the world. And the idea with this is to promote economic education that considers environmental sustainability. This is where we see the intersectionality between environmental, economic, and social spheres. My poster will summarize this in a digestible manner, so that students can access ESG-related information in an efficient manner.

Sustainable City Comparison

Sarah Frischmann, Undergraduate Student, Bucknell University; **Milton Newberry III,** Center for Sustainability & the Environment, Bucknell University.

The global sustainability agenda is often addressed differently across countries, which poses challenges to achieving Sustainable Development Goals (SDGs). In this paper, I conducted a cross-city comparison of five cities across different continents based on criteria from SDGs related to sustainable communities, renewable energy, health and well-being, and responsible consumption through the lens of the Sustainable Cities Index (SCI). The SDGs are a set of 17 goals adopted by the United Nations in 2015 to guide global efforts toward sustainable development. The SCI is a framework that measures the sustainability of cities across different dimensions, including environmental, social, and economic factors. The cities selected for this study were Guanacaste, Costa Rica, London, England, Bangkok, Thailand, Johannesburg, South Africa, Sydney, Australia, and Washington, D.C., United States. The study reveals that all cities are making significant efforts toward sustainability, but the extent of progress varies considerably. Guanacaste and Sydney scored highly in renewable energy and responsible consumption. On the other hand, London and Washington, D.C., showed strong performance in health and well-being, while Guanacaste, Bangkok, and Johannesburg lagged behind. In conclusion, this study emphasizes the need for tailored approaches to sustainability that account for the unique challenges of each city. The SCI is useful for evaluating progress toward sustainability, but it should be complemented by criteria specific to the SDGs to ensure a more comprehensive and nuanced understanding of sustainability. The findings of this study have important implications for policymakers, as they highlight the need for continued efforts to achieve SDGs.

Public Viewpoints on Solar Technology

Michael Hardyway, Undergraduate Student, Bucknell University; **Milton Newberry III,** Center for Sustainability & the Environment, Bucknell University.

As solar technology, a source of clean and renewable energy, has gained national popularity, there are still a proportion of individuals representing various demographic groups that have adopted it to varying degrees. Despite the benefits of solar energy over current energy sources (e.g., fossil fuel and nuclear energy), there are people who are reticent to integrate solar technology into their households or communities. Pennsylvania ranks near the bottom of states in renewable energy generation. The purpose of this research is to investigate public perceptions of solar technology in rural to suburban communities in Pennsylvania. Research has shown a relationship between the possibility of adopting solar technology and demographic parameters such age, income, education, and race/ethnicity. However, there is limited research on the perceptions of solar in rural Pennsylvanians. Other variables that may affect individual and community perception of solar in PA include 1) knowledge on renewable energy and photovoltaic systems, 2) attitudes toward solar technology, 3) the economic cost/benefit analysis of solar over fossil fuel-generated electricity, and perception of other sources of energy (e.g., natural gas). To conduct this study, we compiled prior research from other studies to develop a questionnaire. This instrument would be distributed using online modes of administration and a drop-off/pick-up data collection methodology from the residents of Lewisburg, Milton, Sunbury, and Selinsgrove. The next steps include data collection and analysis and comparisons to existing reports on renewable energy adoption in Pennsylvania.

Growing Change from Seed

Hannah Holmes, Undergraduate Student, Bucknell University; **Katie Faull**, Professor Professor of German and Comparative Humanities, Bucknell University.

Often in the United States, we imagine prisons as dim jail cells where people are punished for crimes committed; however, the modern justice system has begun to take a new approach to these correctional facilities - an approach that emphasizes rehabilitation and reintegration. Instead of utilizing correctional facility systems as punishment, the focus has shifted to providing inmates with opportunity for growth, in preparation to reintegrate into society after serving their sentence. These programs have shown to decrease recidivism and even have long term effects on the mental health of the inmates. A recent trend in these rehabilitation programs has created gardens within facilities, where inmates are able to commit to something long term for delayed gratification. Gardening as a mechanism of rehabilitation has a multitude of benefits, such as social and community connection, increases in overall health, changes in stress and anxiety, and so much more. I am going to explore the benefits of gardening in the context of a correctional system.

Reentry, Recidivism, and Desistance: A Study of Successful Post-Incarceration Programs for the Cumberland County Reentry Coalition

Caroline Kopas, Undergraduate Student, Dickinson College; **Corrine Charney**, Undergraduate Student, Dickinson College; **Pia Mancini,** Undergraduate Student, Dickinson College; **Fajner Correa**, Undergraduate Student, Dickinson College; **Ariadna Camila**, Undergraduate Student, Dickinson College; **Neil Leary**, Director, Center for Sustainability Education, Dickinson College.

Focusing on four incredibly significant and interconnected facets of prison reentry in which can aid formerly incarcerated individuals in rejoining society, our research focuses primarily on the implementation of programs in the context of these facets within Pennsylvania county-level coalitions. Working directly with the Cumberland County Reentry Coalition, we are conducting wide interdisciplinary research on how the coalition can better service the county's reentrants and therefore decrease rates of recidivism and create a more egalitarian and sustainable community in South Central Pennsylvania. Facing a myriad of societal and systematic issues both during and post-incarceration, it is imperative a network is in place to support these reentrants. The aforementioned subtopics of our research are intrinsically interconnected in various relationships, including cause-and-effect, and oftentimes a deficiency in one can negatively impact the others. These subtopics are (1) Housing, (2) Jobs, education, and other economic opportunities, (3) Behavioral health and services, and (4) Prosocial relationships. We have found that successful coalitions pay mind to all four and that this attention can better reintegrate ex-offenders into Cumberland County with longer-term rates of success. Research is ongoing, and our cumulative discoveries so far will be presented comprehensively using salient statistics, sociological research, analysis, and sustainable connections in order to properly display the correlative nature of reentry and how essential reentry services are in community development within Cumberland County and elsewhere. Literature studies, interviews, case studies, and close community collaboration were used to extract data and analysis. Our study is locally concentrated within South Central Pennsylvania, using

resources from Cumberland County prisons and coalition members, as well as programs and initiatives in the local Dauphin, York, Lancaster, Union, and Snyder counties.

Is the widely-cultivated katsura-tree (Cercidiphyllum japonicum) an invasion threat in Pennsylvania?

Kayleigh Long, Undergraduate Student, Bucknell University; **Melody Sain**, David Burpee Postdoctoral Fellow, Bucknell University; **Christopher Martine**, David Burpee Professor of Plant Genetics and Research, Bucknell University.

This project explores the invasive potential of Cercidiphyllum japonicum (katsura-tree, Cercidiphyllaceae), a dioecious tree species native to temperate regions of China and Japan. Due to its characteristic heart-shaped leaves and attractive fall color, C. japonicum is commonly used as an ornamental and shade tree in temperate regions of North America. While the species has been identified as capable of escaping cultivation and/or becoming naturalized, little research on this has been published so far. A unique opportunity on the campus of Bucknell University occurred as regular landscaping/weeding that normally minimizes the possibility of establishment of unwanted plant species was reduced due to the onset of the COVID-19 pandemic until fall of 2022, allowing early stages of germination of C. japonicum to be observed in various locations in the area. For this reason, two surveys were conducted on campus in order to assess the invasive potential of C. japonicum when left undisturbed in ideal conditions. Seedling recruitment data was collected utilizing a 1 x 1 m quadrat method alongside buildings with well-draining gravel. Additionally, an incursion of young C. japonicum trees discovered in a campus woodland was surveyed for size and potential age-class. These surveys of recruited and established individuals allow us to predict what conditions are most conducive to the escape and possible naturalization of C. japonicum in the Mid-Atlantic region. We suggest that the species be categorized as “potentially invasive.”

Internet of Vegetables: Revisions Towards Plant-Based Sensing and Harvesting

Tylor Luong, Masters Student, Bucknell University; **Peter Jansson** , Associate Professor of Electrical Engineering, Bucknell University; **Stewart Thomas**, Assistant Professor of Electrical and Computer Engineering, Bucknell University.

As the worldwide population increases and weather conditions continue to change, modern society has become increasingly dependent on the success of agriculture. The demands of producing large amounts of products while maintaining efficient operations result in agricultural workers facing time consuming tasks, in addition to the inspection of fields and plants. Inspection of each individual plant is a time-intensive task, and so a time trade-off is made between agricultural efficiency (and possible monitoring of individual plants) and worker availability for such tasks. While drones or satellite imaging techniques offer wide scale sensing of large areas, this work aims for plant information on a more granular scale. To aid the agriculture sector in better understanding crop life cycles, efficient monitoring of crops may prove to be a viable option for the future. Towards this effort, this paper studies the feasibility of continuously monitoring plant health and seeks to better understand the electrical signals within plants

and operations of soil based microbial Fuel Cells (MFC) technology, investigating under more controlled conditions and revising errors of previous experiments.

Solanum acanthophisum: a New Dioecious Bush Tomato Species from the Australian Monsoon Tropics

Claire Marino, Bucknell University. **Christopher Martine**, David Burpee Professor of Plant Genetics and Research, Bucknell University; **Tanisha Williams,** Richard E. and Yvonne Smith Postdoctoral Fellow, Bucknell University

Estimates suggest that over 70% of the Australian flora and fauna has yet to be scientifically described. Numerous new plant species are still being described each year from across the continent. Here, we investigate a potential new species represented by just a few herbarium collections made in the remote Deaf Adder Gorge of Kakadu National Park, a biodiversity hotspot and UNESCO World Heritage Site. The new taxon was previously suggested as a possible localized variant of the functionally dioecious Kakadu endemic Solanum asymmetriphyllum and close relative of its sister species S. sejunctum. Using seeds removed from a herbarium sheet, a single ex situ plant was grown and used to assess more than 30 morphological characters to document the differences among S. asymmetriphyllum, S. sejunctum, and the putative new species. Morphometric analyses provide evidence that the three taxa are distinct from one another and support the segregation of the Deaf Adder Gorge variant as Solanum acanthophisum sp. nov. The specific epithet, “acanthophisum” is derived from the generic name of the sympatric death/deaf adder snake, Acanthophis praelongus. Solanum acanthophisum is now one of three recognized Solanum species occurring in Kakadu that exhibit functional dioecy, a sexual system in which morphologically bisexual flowers produce non-functional inaperturate pollen.

Climate Action Plans in Localized Contexts

Maggie McConnell, Americorps VISTA and Bucknell University; **Shaunna Barnhart**, Center for Sustainability & the Environment, Bucknell University.

As temperatures increase around the globe, communities are anticipating or experiencing localized, unique climate effects. Recognizing these realities is important so that communities can devise plans to curb carbon emissions and create strategies to respond to any inevitable effects. Pennsylvania’s DEP Local Climate Action Program partners local governments with universities to create localized solutions that respond to communities’ distinct needs and characteristics. This research explores how climate action plans can be responsive to localized contexts by comparing the drafting and implementation of two local government plans in Pennsylvania. The City of Shamokin and Lewisburg Borough have created community driven, people centered plans that address their emissions portfolios in a way that accounts for their unique attributes. Shamokin is committed to rebuilding their community from a large decline in population and the loss of their main industries of coal and garment. This region is particularly vulnerable to environmental hazards from coal mining legacies and is undergoing an economic revitalization. Lewisburg is committed to building flood resilience and forging a net-zero future. Lewisburg is drafting its Climate Action Plan while Shamokin has recently adopted their Environmental Resiliency plan and is in

the process of implementation. The Environmental Resiliency Plan is working with community partners and residents to develop innovative strategies and build strong partnerships. Through the creation of a Resiliency Committee and a 'Bucknell University Environmental Resiliency VISTA' position, sustainable development has been expanded through capacity building and local outreach.

Reclaiming Vacant Lots: The Inclusion of Pocket Parks in Former Coal Mining Towns

Matt McMullen, Undergraduate Student, Bucknell University; **Shaunna Barnhart**, Center for Sustainability & the Environment, Bucknell University.

The towns that form Pennsylvania's lower anthracite coal region have been on a steady decline in economic and social terms. As the site of former mining and industrial enterprises, these towns now face several challenges from abandoned properties. With this in mind, a research question was formulated: How can vacant lots in former coal mining towns be converted into community assets to fit the community's vision for revitalization?

Revitalization efforts for such towns come in all forms, but pocket parks and urban green spaces are particularly pertinent. In urban, low-income communities, the need for green space is important, as they provide an outlet for residents to rest, increase social interactions among community members, and reduce stress. Not only do parks improve the well-being of the general community, but they also aid the landscape. Incorporating plants and other types of biodiversity can enhance the environment. In an effort to reclaim abandoned spaces, towns can find benefit in the revitalization of these lots by turning them into public green spaces. Community engagement and feedback is the most important factor in the process of design, as the residents will be the primary users of these parks. Working with local organizations, this research utilized surveys and interviews to inform an iterative design process based on community feedback, with a primary focus on the towns of Shamokin, PA, and Kulpmont, PA. Research results in Kulpmont demonstrate that while respondents are proud to live in Kulpmont, fewer feel connected to their neighbors. However, respondents are looking for more places to gather as a community thus new neighborhood parks could help address this disconnect. Overall, this research outlines the processes of revitalization and park design, while also examining the benefits of green spaces and reclamation of vacant lots.

Union County Solar Energy Awareness

Amanda Pennett, Undergraduate Student, Bucknell University; **Shaunna Barnhart**, Center for Sustainability & the Environment, Bucknell University.

Rural communities in Pennsylvania, such as Union County, have a historical and political reliance on traditional fossil fuels like coal, oil and natural gas. Solar energy, an alternative energy source, is a renewable form of energy that is environmentally beneficial to the community, localizes energy production and provides one with energy independence from primarily relying on grid provided electricity. Raising awareness around the potential of solar energy in Union County requires an understanding of the

historical view of energy and collection of data on current perspectives around solar to determine the most effective way to communicate its benefits. The path to solar energy looks different for everyone, with residents of Union County facing barriers unique to their state, neighborhood or home. Through survey and interviews, personal challenges and journeys are collected to analyze what tools residents and businesses need to participate in solar energy. Educational materials including a digital infographic and physical brochures that communicate the general benefits, resources and steps to install solar were created for Union County Department of Planning and Development.

Determining Best Practices for Bike Policy: Improving the Lewisburg Borough's Bikeability through Community Consultation

Morgan Powell, Bucknell University; **Taylor Lightman**, Director, Lewisburg Neighborhoods; **Shaunna Barnhart**, Center for Sustainability & the Environment, Bucknell University.

Transportation by car has always posed issues of safety and pollution, and reliance on cars creates traffic congestion and high-maintenance infrastructure. While cycling not only eliminates these problems, it comes with additional health, economic, and environmental benefits. Transportation in the Lewisburg Borough is recognized as the majority source (56%) of greenhouse gas emissions. As a response to this, in addition to public interest in increased frequency and safety of biking, Lewisburg Neighborhoods formed the Walk It! Bike It! Committee in 2015. Since then, Lewisburg Neighborhoods and the Bucknell Center for Sustainability & the Environment has created a Climate Action Plan as part of a statewide initiative from the Department of Environment Protection, which outlines recommendations for improving the infrastructure and safety of Lewisburg's active transportation. In 2019, a survey was conducted to assess perceptions of cycling in the greater Lewisburg area. Based on those preliminary results, in 2022 this project conducted a more extensive survey on the community's biking habits, concerns, and desired improvements with the intention of informing Borough decisions regarding cycling safety and infrastructure. Analysis of the 157 responses received from the revised survey indicates that more people would like to bike to places around Lewisburg than are currently able, and that issues of safety and networked routes prevent them from doing so. Participants also outlined the obstacles they view as most significant to cycling and gave a general consensus that safety concerns are of a higher priority to address than infrastructure improvements. These results have been summarized and provided to the Lewisburg Borough to bring awareness to these issues and to inform decisions being made to improve Lewisburg's bike-friendliness.

Upping the Game!

Emily Reinhardt, SUNY Plattsburgh Center for Earth and Environmental Science; **Kristen Lisowy**, Research Assistant, SUNY Plattsburgh; **Devin DeSantis**, Research Assistant, SUNY Plattsburgh; **Curt Gervich,** SUNY Plattsburgh Center for Earth and Environmental Science.

We create interactive, multiplayer tabletop, role-playing and puzzle games that teach about the environment through discovery and play. Our work builds on the legacy of serious gaming-- a theory of educating and engaging learners in social change through the gamification of real world problems.

Gamification refers to the development of puzzles, games and simulations that incorporate scientific data and real world dynamics. When playing serious games, learners soak up educational content subconsciously, and grow through inquiry and experimentation. Currently we are hosting a climate simulation game that we adapted from Climate Interactive, that is based on the real negotiations of the United Nations.

Perceptions of Renewable Energy in Anthracite Coal Towns

Matthew Semeraro, Undergraduate Student, Bucknell University. **Shaunna Barnhart**, Center for Sustainability & the Environment, Bucknell University; **Milton Newberry III**, Center for Sustainability & the Environment, Bucknell University.

As climate change threatens our way of life in modern day, alternative renewable energy sources have become more and more prevalent. However, many communities are still dependent on nonrenewable energy sources. The Charging Ahead - Solar Charging Stations in Anthracite Coal Towns project is working to create spaces to increase public awareness of the ease of renewable energy sources like solar energy production. Working with the Ford Motor Company Fund and Bucknell Center for Sustainability and the Environment, our team developed numerous public education materials directly informed by the surrounding communities' perception of renewable energy. Educational surveys were conducted in both Shamkoin and Mount Carmel areas of Central Pennsylvania to gain an awareness of the public's perception of renewable energy. These surveys informed a detailed analysis of the surrounding communities' renewable energy knowledge. They uncovered local perceptions of renewable energy regarding its use, safety, environmental awareness and cleanliness. It was found that the public is aware of the benefits of solar energy productions but still has some concerns regarding safety and practical use. Additional public education materials were developed to address these questions as we produce local student built solar charging tables. These tables will be located in surrounding public spaces to familiarize the local community with renewable energy production like solar and its ease of use.

Place-based learning + culture/history + wellness

Stu Thompson, Electrical and Computer Engineering, Bucknell University; **Katherine Faull**, Professor of German and Humanities, Bucknell University; **Shaunna Barnhart**, Center for Sustainability & the Environment, Bucknell University; **Cuong Nguyen,** Undergraduate Student, Bucknell University; **Anna Ottman** Undergraduate Student, Bucknell University.

In response to the widely reported increase in obesity and related health problems in the US, a team of faculty, staff and students at Bucknell University has authored a successful mobile app that incentivizes exercise through the use of crowdsourced public-facing humanities content of local interest. Recognizing that the creation of "smart cities" and public spaces greatly enhances the sense of place among local citizens, the app encourages engagement with interesting place-based content in real-time through the collection of completed pathways and the achievement of fitness levels for financial rewards through local business partnerships. In this poster, we explore recent developments with the app through expanding collaborative partner networks.

Planted in Place: Developing an Exhibit for the Milton Municipal Museum

Hannah Tran, Undergraduate Student, Bucknell University; **Shaunna Barnhart**, Center for Sustainability & the Environment, Bucknell University; **Claire Campbell**, Professor of History, Bucknell University; **Christopher Martine,** David Burpee Professor of Plant Genetics and Research, Bucknell University; **Emma Downey**, The Improved Milton Experience.

Planted in Place is an exhibit that walks you through the late 1800s and early 1900s Milton by centering stories from reproductions of Sanborn insurance maps for downtown and changing plant communities on the Milton State Park island and riverbank. The exhibit shows a record of human intention as well as human action: the quest for growth and ideas of civic progress, what people want from the place as well as what they do there. The inaugural exhibit of the Milton Municipal Museum pairs reproductions of Sanborn insurance maps (in the public domain, and available from Penn State University) of blocks of south Front Street, with botanical illustrations and specimens of the plant communities that grow along the riverbank and the island adjacent to the building – both native and introduced. The accompanying text highlights elements of the built and ecological context that illustrate the town's evolution. This exhibit is the result of a partnership between The Improved Milton Experience and an interdisciplinary collaboration of students, faculty, and staff from History, Biology, Environmental Studies, Management, and the Center for Sustainability and the Environment at Bucknell University. In this research poster, we explore the collaborations and processes leading to the exhibit and reflect on the meaning and implications of the exhibit content for understanding Milton's changing landscapes.

Charging Ahead: Solar Charging Stations in Anthracite Coal Towns

Wolfgang VonGetzie, Undergraduate Student, Bucknell University. **Shaunna Barnhart**, Center for Sustainability & the Environment, Bucknell University; **Milton Newberry III**, Center for Sustainability & the Environment, Bucknell University.

Advancement in solar energy has increased substantially in recent years. This has caused the cost of solar panels to become much cheaper than before, and more people across the world are taking advantage of this to become more sustainable. However, people can be reluctant to change, and implementing solar panels broadly cannot be done quickly. In order to meet the energy needs of the world with renewable, solar energy, the principles and benefits of solar energy should be communicated to the general public. One method to communicate this is to slowly integrate examples of solar energy in practice into community spaces. This is the goal of our solar bench project, where our team has designed a solar bench capable of charging devices such as laptops and cellphones. Working with students from the Northumberland County Career and Technology Center, two solar benches are being constructed and placed at two high schools in central Pennsylvania: Shamokin Area High School and Mount Carmel Area High School. Students are learning about solar energy in their classes at these schools, so with access to a bench that charges their devices at school they will be able to see the application of what they are learning. With this experience, solar energy can become a more normalized energy option. More benches

will be constructed in community areas such as parks and libraries, and educational materials such as brochures and additional online resources will be made accessible to the public to further spread awareness of and exposure to the benefits of solar energy in the community. This presentation will also highlight the challenges of working with community-led organizations, and explore the nuances of collaborating with students, professionals, and community leaders.

Enhancing Electrical Engineering Curriculum with Hands-On Renewable Energy Projects.

Devin Whalen, Masters Student**,** Bucknell University; **Peter Jansson**, Professor of Electrical and Computing Engineering, Bucknell University.

At Bucknell University, instructors continue to make enhancements to the learning experience offered by the ECE curriculum, including the fundamental circuits course ECEG 210. A recent addition to the course is a renewable energy focused project that reinforces the engineering design process, a fundamental aspect of the curriculum across all years of study. The purpose of this approach is to introduce second-year electrical and computer engineering students to the pressing challenges and opportunities presented by the increasing availability of renewable energy. This study explores the innovations implemented into the ECEG 210 course to develop students' skills and knowledge in the solar photovoltaic (PV) industry. Through the project, students gain experience in designing and implementing renewable energy solutions and a better understanding of the practical applications of the engineering concepts they learn in the classroom, making them better equipped to face real-world engineering challenges. This great addition to the course (the innovative entrepreneurial photovoltaic project aspect) was made possible with the generous funding of the William Corrington Renewable Energy fund.

Conservation of a rare species: taxonomic uncertainty and the potential role of a narrowly-occurring specialist pollinator

Madeline Wickers, Undergraduate Student**,** Bucknell University. **Anais Barnes**, Bucknell University; T**anisha Williams**, Richard E. and Yvonne Smith Postdoctoral Fellow, Bucknell University; **Scott Schuette**, Botany Program Manager, Pennsylvania Natural Heritage Program at Western Pennsylvania Conservancy; **Christopher Martine**, David Burpee Professor of Plant Genetics and Research, Bucknell University.

Heuchera alba and H. pubescens (Saxifragaceae) are closely related species of the Appalachian Region of eastern North America that are difficult to distinguish morphologically. Heuchera pubescens is currently understood to occupy a range from Kentucky to Pennsylvania, with the distribution of H. alba restricted to Virginia and West Virginia – plus a recently-recorded extension into Pennsylvania discovered with the help of Twitter. In addition to the discovery of H. alba in Pennsylvania, a pollinator known as the alumroot cellophane bee (Colletes aestivalis) was seen visiting its flowers - the first state record of this bee in over a century. The uncovering of H. alba as well as its specialized pollinator in Pennsylvania has challenged historical perceptions of Heuchera distributions in the state, particularly as this relates to current records for H. pubescens. Through a partnership between Bucknell University and the Western Pennsylvania

Conservancy, substantial fieldwork was completed this past summer, including the collections of H. alba samples and C. aestivalis at multiple sites. It was found that records for H. pubescens in the Susquehanna River Valley can instead be attributed to H. alba. This finding has potential implications for the assessment of the true distribution for both species and the genetic status/health of each species in the local region. Our lab will now use population genomics to generate measures of genetic diversity and population structure, with the goal of updating the conservation status for each study species and to inform future conservation management of H. alba, H. pubescens, or both. We also hope to assess the link between genetic structure among H. alba populations and its reliance on a habitat-specific oligolectic bee.

Impact of US Invasive Species on Aquatic Biodiversity in China

Carol Zheng, Undergraduate Student, Bucknell University; **Mizuki Takahashi**, Associate Professor of Biology, Bucknell University.

This presentation introduces research on the alligator gar and its effect as an invasive species outside of North America. I found that people in the U.S. often think they are on the receiving end of invasive species when Asian nations also receive a large amount of American invasive species that affect their natural and human communities. This discrepancy can be a great source of information to spread to the public about the impact of invasive species at an international level. This research aims to investigate and raise awareness about the impact of the invasive alligator gar species on aquatic biodiversity in China and negative perceptions against Asian countries and people due to the invasive species. This project proposal aims to investigate and raise awareness about the impact of the invasive alligator gar species on aquatic biodiversity in China and possibly negative feelings against Asian countries and people due to the invasive species. The project will be conducted through a series of public presentations, social media campaigns, and displays.

AUTHOR INDEX

AUTHOR INDEX (*continued*)

AUTHOR INDEX (*continued*)

Poster and Creative Works Judges

A special thanks to the judges of the Poster, Art Display, and Creative Works Session:

Emma Banks
Assistant Professor of International Relations

Lorelei Curtin
Assistant Professor of Geology & Environmental Geosciences

Matt Higgins
Faculty Director, Center for Sustainability & the Environment
Claire W. Carlson Chair in Environmental Engineering, Prof. of Civil & Environmental Engineering

BCSE Ambassadors

A special thank you to the inaugural cohort of BCSE Ambassadors providing support to the Sustainability Symposium:

Fehr Gillett ‘25
Environmental Studies major

Michael Hardyway ‘25
Environmental Studies major

Leeann Michael ‘24
Environmental Engineering major

Bridget Nayduch ‘25
Psychology major

Sopheak Thy ‘25
Anthropology and Psychology double major

Chloe Wendell ‘25
Environmental Studies major

Conference Committee

Shaunna Barnhart, Ph.D.
Director, Places Studies Program
Center for Sustainability & the Environment

Milton G. Newberry, III, Ph.D.
Director, Sustainable Technology Program
Center for Sustainability & the Environment

Janeen Putman
Operations Director, Center for Sustainability & the Environment

Krista Smith
Office Assistant, Center for Sustainability & the Environment

Emily Dietrich
Director, Strategy Implementation and Operations
Co-Leader, STEM Career Community
Center for Career Advancement (CCA)

Matt Higgins
Faculty Director, Center for Sustainability & the Environment
Claire W. Carlson Chair in Environmental Engineering, Professor of Civil & Environmental Engineering

Jesse Greenawalt
Event Technology Specialist
Library & Information Technology

Jeffrey Campbell
Senior Event Technology Support Specialist
Library & Information Technology

Maggie McConnell
Americorps VISTA
Center for Sustainability & the Environment

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